

USDA
NATURAL RESOURCES
CONSERVATION SERVICE

DELAWARE CONSERVATION
PRACTICE STANDARD

ROOF RUNOFF STRUCTURE

CODE 558
(Reported by No.)

DEFINITION

Structures that collect, control, and transport precipitation from roofs.

PURPOSES

This practice may be applied for one or more of the following purposes:

- Improve water quality.
- Reduce soil erosion.
- Increase infiltration.
- Protect structures.
- Increase water quantity.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where:

- Roof runoff structures are a component of an overall resource management system.
- Roof runoff needs to be diverted away from structures or contaminated areas.
- There is a need to collect, control, and transport runoff from roofs to a stable outlet.
- Roof runoff is collected and used for other purposes.

CONSIDERATIONS

Avoid discharging outlets near wells or into structures that discharge directly into surface waters.

This practice has the potential to affect National Register listed cultural resources or eligible (significant) cultural resources. These may include archeological, historic, or traditional cultural properties. Care should be taken to avoid adverse impacts to these resources. Follow NRCS state policy for considering cultural resources during planning.

CRITERIA

Criteria Applicable to All Purposes.

Design Capacity. At minimum, a 10-year frequency, 5-minute rainfall precipitation event shall be used to design roof runoff structures, except where excluding roof runoff from manure management systems. In that case, a 25-year frequency, 5-minute precipitation event shall be used to design roof runoff structures (Refer to Agricultural Waste Management Field Handbook, National Engineering Handbook - Part 651, Appendix 10B). When gutters are used, the capacity of the downspout(s) must equal or exceed the gutter flow rate.

Outlets. Runoff may empty into surface or underground outlets or onto the ground surface. Surface and underground outlets shall be sized to ensure adequate design capacity and shall provide for clean-out as appropriate. When runoff from roofs empties onto the ground surface, a stable outlet shall be provided. When runoff is conveyed through a gutter and downspout system, an elbow and energy dissipation device shall be placed at the end of the downspout to provide a stable outlet and direct water away from the building.

Surface or ground outlets such as rock pads, rock filled trenches with subsurface drains, concrete and other erosion-resistant pads, or preformed channels may be used, particularly where snow and ice are a significant load component on roofs.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

Vegetation. Disturbed areas that are not to be cultivated shall be seeded as soon as practicable after construction. Planting shall be specified in accordance with NRCS Practice Standard 342, Critical Area Planting, for seeding.

Supports. Where snow and ice will accumulate on roofs, guards and sufficient supports to withstand the anticipated design load shall be included.

Materials. Roof runoff structures shall be made of durable materials with a minimum design life of ten years. Roof gutters and downspouts may be made of aluminum, galvanized steel, wood, or plastic. Aluminum gutters and downspouts shall have a nominal thickness of 0.027 inches and 0.020 inches, respectively. Galvanized steel gutters and downspouts shall be at least 28 gauge. Wood shall be clear and free of knots. Wood may be redwood, cedar, or cypress. Plastics shall contain ultraviolet stabilizers. Dissimilar metals shall not be in contact with each other.

Rock-filled trenches and pads shall consist of poorly graded rock (all rock fragments approximately the same size) and be free of appreciable amounts of sand and/or soil particles. Crushed limestone shall not be used for backfill material unless it has been washed. Subsurface drains or outlets shall meet the material requirements of the applicable NRCS conservation practice standard.

Concrete appurtenances used shall meet the requirements of NRCS Construction Specification 32, Concrete for Minor Structures.

Protection. Roof runoff structures shall be protected from damage by livestock and equipment.

Additional Criteria to Increase Infiltration

Runoff shall be routed onto pervious landscaped areas (e.g., lawns, mass planting areas, infiltration trenches, and natural areas) to increase infiltration of runoff. These areas shall be capable of infiltrating the runoff in such a way that replenishes soil moisture without adversely affecting the desired plant species.

Additional Criteria to Protect Structures

Runoff shall be directed away from structure foundations to avoid wetness and hydraulic loading on the foundation.

On expansive soils or bedrock, downspout extensions shall be used to discharge runoff a minimum of five (5) feet from the structure.

The discharge area for runoff must slope away from the protected structure.

Additional Criteria to Increase Water Quantity

Structures needed to collect and store water from roofs for potable and non-potable purposes shall be designed and installed in accordance with sound engineering principles. Storage structures for non-potable purposes, such as irrigation water, should be designed in accordance with NRCS conservation practice standards, as appropriate.

Potable water storage structures should be constructed of materials and in a manner that will not increase the contamination of the stored water. Roof runoff collected and stored for potable uses must be treated prior to consumption and should be tested periodically to assure that adequate quality is maintained for human consumption.

PLANS AND SPECIFICATIONS

Plans and specifications for this practice shall be prepared in accordance with the previously listed criteria. Plans and specifications shall contain sufficient detail concerning site preparation and establishment to ensure successful management of the practice. Appropriate conservation practice standards shall be used for designing and installing structural and vegetative measures. Documentation shall be in accordance with the section "Supporting Data and Documentation" in this standard.

OPERATION AND MAINTENANCE

An Operation & Maintenance Plan shall be developed that is consistent with the purposes of

the practice, intended life, safety requirements, and the criteria for the design. The plan shall contain, but not be limited to, the following provisions:

1. Keep roof runoff structures clean and free of obstructions that reduce flow.
2. Make regular inspections and perform repair maintenance as needed to ensure proper functioning of the roof runoff structures.

SUPPORTING DATA FOR DOCUMENTATION

The following is a list of the minimum data and documentation to be recorded in the case file:

1. The location of the practice marked on the conservation plan map.
2. Assistance notes.
3. Completed copy of the appropriate Job Sheet(s) or other specifications for seeding. See NRCS Practice Standard 342, Critical Area Planting.
4. Operation and Maintenance Plan.

Field Data and Survey Notes

Record on survey notepaper, SCS-ENG-28, or other appropriate format. The following is a list of the minimum data needed:

1. Plan view sketch showing the location and dimensions of the roofs.
2. Profile of existing ground along the proposed roof runoff outlet structures.
3. Locations and elevations of the proposed outlets for the roof runoff.

Design Data

Record on appropriate engineering paper. For guidance on the preparation of engineering plans see Chapter 5 of the Engineering Field Handbook, Part 650. The following is a list of the minimum required design data:

1. Determine soil type and any special restrictions.
2. Determine peak runoff from the contributing roof area for the required design storm in accordance with Agricultural Waste Management Field Handbook, National Engineering Handbook - Part 651, Appendix 10B, or by other approved method.
3. Determine the required gutter size and size and number of downspouts needed.
4. Show the engineering job class on the plans. Show the location description and elevation of temporary benchmarks utilized in the design survey. Provide a location map, which indicates the job site.
5. Show the location, spacing, size, and grade of all gutters and downspouts and the type and quality of material to be used.
6. Details of underground outlets (if utilized) including the alignment, size and grade. Provide a profile of each line and outlet details.
7. Details of rock filled trenches (if used) including the location, length, typical cross section, and rock gradation requirements.
8. Details of energy dissipation devices (if used) including the location, dimensions and material requirements.
9. Show on the plans the planting plan for disturbed areas.
10. Estimated quantities and cost estimate.

Construction Check Data/As-Built Plans

Record on survey notepaper, SCS-ENG-28, or other appropriate format. Survey data will be plotted on the as-built plans in red. The following is a list of minimum data needed for as-built documentation:

1. Documentation of site visits. The documentation shall include the date, who performed the inspection, specifics as to

what was inspected, all alternatives discussed and decisions made and by whom.

2. Check notes recorded during or after completion of construction showing the location and size of the installed gutters and downspouts. During installation, check and record the size and grade of underground outlets (if specified) and/or the length, dimensions, and the rock gradation of the rock filled trenches (if specified) as well as the measurements and materials of the energy dissipation devices (if specified).
3. Statement regarding the final grading and seeding.
4. Final quantities and documentation for quantity changes. Material certifications as appropriate.
5. Signature and date on check-notes and plans of someone with the appropriate engineering job approval authority. Include a signed statement that constructed practice meets or exceeds the construction plans and NRCS practice standards.